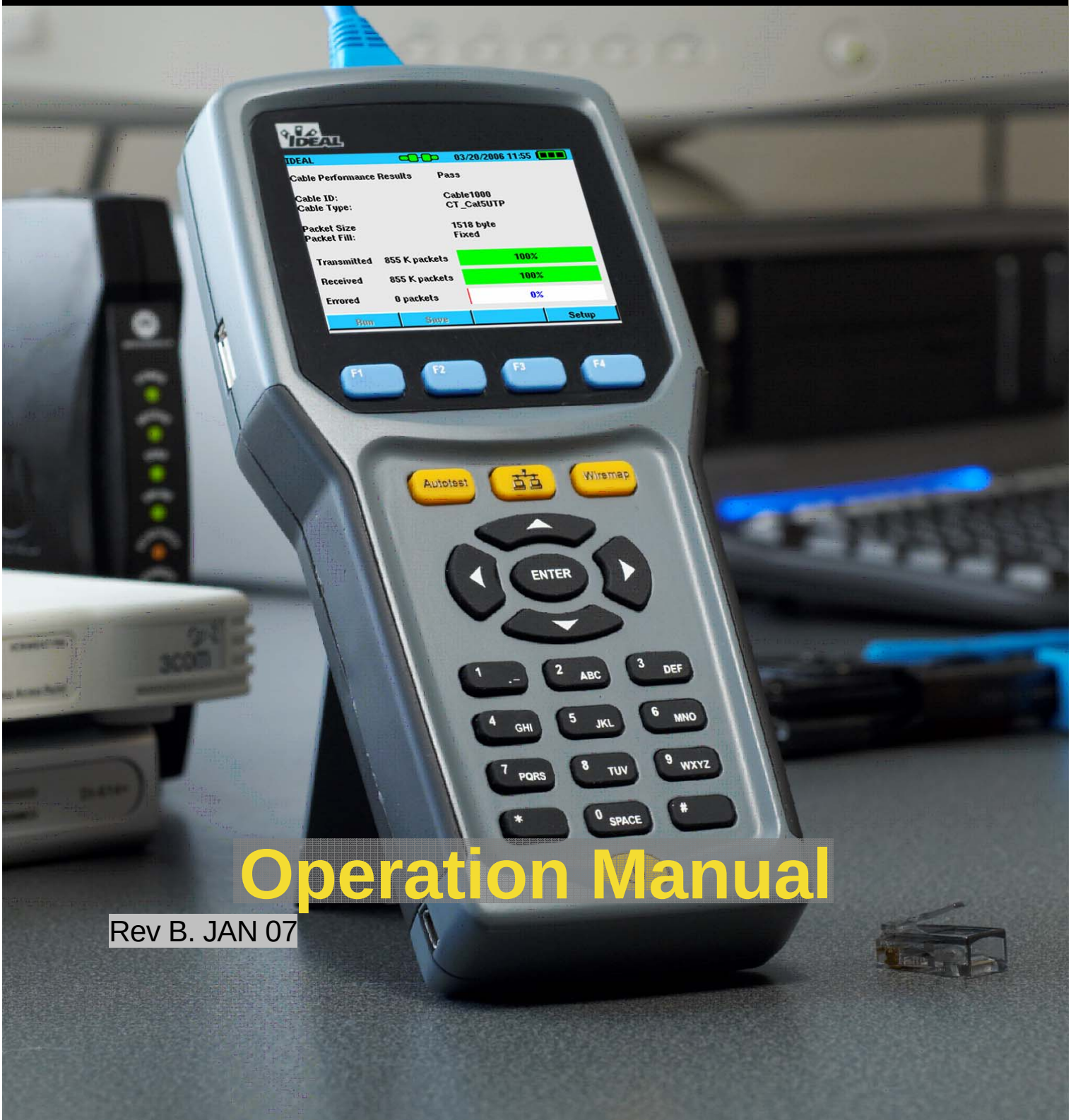
SIGNAL TEK™

Cable Performance Tester



Operation Manual

Rev B. JAN 07

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1 *Introduction*

SIGNALTEK is a unique cabling tester that offers the user the ability to test the performance of a wide range of installed cable system characteristics. With SIGNALTEK, the user can verify network performance, troubleshoot connectivity problems, and view network speeds to determine if the installed cable provides the necessary performance to support desired applications.

- SIGNALTEK is easy to use. It offers any installer the ability to perform cable performance tests and rapidly locate connectivity issues.
- SIGNALTEK will generate performance reports that can be viewed and printed with any web browser. No special software is necessary making it easy to view, print, and share test data.
- SIGNALTEK can test cable links in one of three conditions: Terminated with the SIGNALTEK remote device; Active LAN Links that terminate to a hub, switch, or PC; or to a single-ended link that is not terminated to a device at the opposite end.
- SIGNALTEK uses two test handsets that allow full-duplex performance testing of cables at Ethernet speeds of up to 1 Gigabit per second (1Gbps).

Cable Qualification Testing

Most cable installers are familiar with TIA-568 or ISO-11801 cabling standards. All cable certification instruments such as IDEAL LANTEK Certifiers perform measurements to these standards at frequency ranges specified by these standards. The concept behind certification testing is that the cable is being tested to provide support for any communications protocol that operates in a given frequency range. For some installations this level of

testing is critical because the cabling installer does not necessarily know what types of devices are going to used on the network.

For example, a network that has been certified to meet the requirements for Category 5e performance can support various applications such as 10/100/1000 Mbps Ethernet, 155Mbps ATM, RS-488, RS-232, and many more. However, it is often the case that in any residential or commercial network, Ethernet devices will be the only type used.

SIGNALTEK uses the IEEE 802.3ab (Gigabit Ethernet) standard as a reference for cable performance testing. Rather than a traditional certification test where frequency-based parameters such as Near End Crosstalk (NEXT) and return loss are measured, performance or qualification testing, as it is sometimes called, is a Bit Error Rate Test (BERT). Data packets are sent down the cable to the remote handset then re-transmitted back to the display handset where the number of lost or errored packets is counted. The results are displayed for the user to get an instant view of the cable's performance. A cable performance test is marked as a "pass" or "fail" based on the IEEE 802.3ab parameters which specify the number of error packets allowed in a given test time.

The IEEE (Institute of Electrical and Electronic Engineers) has created a set of standards that allows hardware and software to perform over a variety of media. Unlike the EIA/TIA which specifies cabling limits to support various communications protocols, the IEEE creates the actual protocols. The 802 structure addresses the following transmission protocols:

- 802.3 Ethernet over a physical medium (twisted pair)
- 802.4 Token passing over a Bus topology
- 802.5 Token passing over a Ring topology
- 802.11 A family of wireless signaling standards (Wi-Fi)
- 802.12 Shared media standard that will support Ethernet and Token Ring on the same physical network

SIGNALTEK Test Functions

SIGNALTEK can perform a variety of both passive and active tests on communications cable. The passive tests are those where SIGNALTEK is connected to both ends of the cabling link. Active tests are those in which one end of the link is connected to an active network device such as a PC, switch, router or other device and the opposite end of the link is connected to the SIGNALTEK handset.

- Wire map – Displays the physical paring of the cable. Also displays the length of each pair, the condition of the termination (terminated, open, shorted) and the delay skew when a Gigabit link is established.
- Link Establishment – Displays the fastest Ethernet speed that SIGNALTEK was able to establish on the link. When the link is terminated with a SIGNALTEK remote handset, Link Establishment will display 10, 100 or 1000 Mbps depending on the quality of the cabling. When connected to an active LAN link, Link Establishment will display the fastest speed that was negotiated with the remote switch/hub/NIC.
- Cable Performance – Displays the BERT data results for links tested between the SIGNALTEK display and remote handsets. Information displayed includes: packet size, total number of packets transmitted, number of packets received, number of packets with errors, and a percentage bar graph of each.

  Note: The setup options allow the Cable Performance test to be run with default IEEE 802.3 parameters or customized with a user defined test time and failure threshold.

- VoIP (Voice over IP) Performance – Similar to the Cable Performance test except that the packets are smaller to accurately simulate VoIP transmissions.

- Web Performance – Performance test that simulates the size and payload of typical internet packets.
- IP Video Performance – Performance test that simulates the size and payload of typical IP video applications.

  Note: IP Video is not the same as CATV broadband video. This test is useful to test twisted pair links that will be used to support IP cameras for security applications.

- DHCP – When connected to active Ethernet networks the display handset will locate a DHCP (Dynamic Host Configuration Protocol) server and request an IP address from the server. The data displayed is: SIGNALTEK's IP address, IP address of the DHCP server, the IP address of the network router, IP subnet, and the name of the internet service provider (ISP).
- Ping – Displays the results of the ping test when SIGNALTEK is connected to an active Ethernet network. The user can choose the target IP address to ping, the packet size, the number of packets to send, the delay between packets, and the failure threshold.

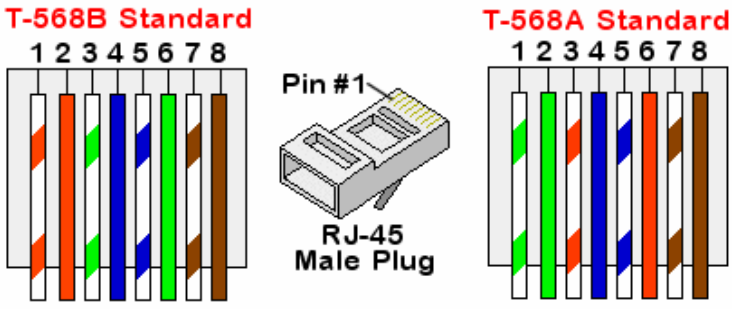
Cable Types

SIGNALTEK is compatible with a variety of cable types and configurations. Cable Performance tests can be run on any type of twisted pair cable that supports Ethernet. Since 10/100 Ethernet requires a minimum of two pairs to operate, cables with only one pair cannot be tested for Ethernet performance, this includes coax cable types.

When performing a Cable Performance test it is important to consider the physical wiring requirements of Ethernet. If the cable is not wired in a compatible manner, the Cable Performance test will be unable to run since an Ethernet link cannot be established.

10/100 Ethernet requires two twisted pairs to be terminated to the RJ-45 connector. Each transceiver will transmit on pins 1/2 and receive on pins 3/6.

Figure 1-1 T-568 A/B Color Code



There is no performance difference between T568-A and T568-B wiring configurations. However most standards recommend the use of the T568-A configuration since it provides better compatibility with telephone wiring used in residential applications.

Gigabit Ethernet (1000Base-T) operates over Category 5 or better cable and utilizes all four pairs of the cable.

Table 1-1 Ethernet Signaling

RJ-45 Pin #	10/100 Mbps	1000Mbps
1	Tx +	Bi-Dir A +
2	Tx -	Bi-Dir A -
3	Rx +	Bi-Dir B +
4	Unused	Bi-Dir C +
5	Unused	Bi-Dir C -
6	Rx -	Bi-Dir B -
7	Unused	Bi-Dir D +
8	Unused	Bi-Dir D -

Cable types that can be tested with SIGNALTEK:

- CAT 3 UTP
- CAT 3 STP
- CAT 5e UTP
- CAT 5e STP
- CAT 6 UTP
- CAT 6 STP
- CAT 6a UTP
- CAT 6a STP
- CAT 7 STP
- USOC (3 pair)
- Single Pair
- RG6
- RG59

Test Port and Cable Adapters

SIGNALTEK is configured to allow testing of the following interfaces:

- RJ45, 4 pair UTP/STP
- RJ12, 3 pair UTP Telephone wire
- Coaxial Connector Type “F”

Standard Accessories

- 2 x RJ45 STP Cat 5e patch cord
- 2 x RJ45 to RJ12 silver satin telephone patch cord
- 2 x RJ45 to coaxial “F” adapter cord
- 2 x RJ12 to alligator clip cable
- 2 x RJ45 to RJ12 adapter
- USB “A” to mini “B” cable
- 8 x AA alkaline batteries
- Soft-sided carrying case

Optional Accessories

- 120-240 volt AC power adapter with multi national plugs (Part Number 4010-00-0136)

Memory

SIGNALTEK test records are stored internally in the display unit and can be copied to a USB memory drive. Internal memory capacity is approximately 20,000 records. External memory capacity is limited only by the size of the USB memory drive.

Stored record files can be copied to a PC using a common USB memory drive device or be transferred to the PC from the SIGNALTEK with the provided USB cable.

Tests:

The following table indicates which tests can be run on a variety of cable types.

> *Note: All cable performance measurements require the presence of at least two pairs of wires terminated in accordance with the TIA-568 A/B wiring configuration. Cable performance tests cannot be run on cables terminated with the USOC wiring configuration or on cables with fewer than 2 pairs of conductors (i.e. coax, alarm, speaker wire).*

Table 1-2 Cable Test Ability Chart

Cable Types	Mapping	Shorted Pairs	Opens	Reversed Pairs	Length	Distance to Open	Distance to Short	Cable Performance (10/100/1000Mbps)
Data								
CAT 5 UTP	X	X	X	X	X	X	X	X
CAT 5e UTP	X	X	X	X	X	X	X	X
CAT 6 UTP	X	X	X	X	X	X	X	X
CAT6a UTP	X	X	X	X	X	X	X	X
CAT 5 STP	X	X	X	X	X	X	X	X
CAT 5e STP	X	X	X	X	X	X	X	X
CAT 6 STP	X	X	X	X	X	X	X	X
CAT 6a STP	X	X	X	X	X	X	X	X
CAT 7 STP	X	X	X	X	X	X	X	X
Phone								
CAT 3 - 3 pair	X	X	X	X	X	X	X	10/100
CAT 3 - 4 pair	X	X	X	X	X	X	X	X
Coax								
RG 59/6	X	X	X		X	X	X	
Misc.								
2-Wire	X	X	X		X	X	X	

Figure 1-2 SIGNALTEK Handsets

The following table describes the function of each button and LED on the SIGNALTEK handsets.

Table 1-3 Key and LED Functions

Button	Function
	F1-F4 keys are used to perform different functions depending on the current screen. Options for these keys are displayed on the LCD above each key.
	When pressed, the SIGNALTEK display will automatically change to the Autotest tab and begin running an Autotest. Pressing the Autotest button on the remote handsets will also initiate an Autotest.
	Brings up the Manual tab. Individual tests can be selected and run for diagnostics or troubleshooting. Manual tests cannot be stored to memory. Pressing this button on the remote handset while connected to an active LAN port will display the speed of the device (PC or switch) at the other end of the link.
	Brings up the Job tab where the name of each job folder and the number of stored tests are displayed.
	The directional keypad and Enter keys are used to navigate around the SIGNALTEK user interface. When the tab color is yellow, the left and right arrow keys are used to move between the tabs. Pressing up or down scrolls through the options within each tab. To change tabs, make sure to press up or down until the tab color changes back to yellow.
	The alpha-numeric keys are used to enter text and numbers into various fields in the SIGNALTEK user interface. Pressing a key multiple times will cycle through the letters and number on that key. Use the left arrow on the directional keypad to backspace and erase the character to the left of the cursor.

	The # key also functions as Escape to return to the previous screen.
	The power button turns SIGNALTEK on and off and also controls the backlight brightness. To turn on, press and release the button. To turn the power off, press and HOLD the button until the screen turns off, then release. Tap the button to cycle between the three backlight brightness levels; High, Low, and Off. Press and hold for 5 seconds to turn off the remote handset.

Remote Handset Functions	
LINK LED	Indicates the detection of the SIGNALTEK display or an active LAN device. Lights green when the remote detects that it is connected to the display handset. Lights red when the remote detects another active LAN device such as a switch.
LOOPBACK LED	Lights green when a cable performance test is running. Indicates that a link is established and the handsets are transmitting data to each other.
STATUS LED	During a test, flashes green to indicate a test is in progress. After a test, lights green to indicate a pass or red to indicate a fail. When the button is pressed while connected to an active LAN, the STATUS LED lights red to indicate 10Mbps, flashes green to indicate 100Mbs, or lights steady green to indicate 1000Mbps.
BATTERY LED	Lights green, orange, or red to indicate battery charge status.

Batteries & Power

Each SIGNALTEK handset is powered by four AA batteries. Alkaline batteries are included. User supplied NiMH or NiCd rechargeable batteries may be used in either handset.

The optional AC-DC power supply may be used to power the handsets for extended periods of time.

If using rechargeable batteries, they must be charged in an external charger. The Gigabit transceiver in the handsets draws a considerable amount of power when performing cable tests, therefore high-capacity NiMH batteries are recommended. Battery capacities of 2300-2500mAh will provide the best runtime between charges.

> *Note: The power input port is only used to provide power to the handsets. It will not charge batteries that are installed in the handsets. This is a safety feature as accidental charging of alkaline batteries can cause the batteries to rupture, possibly damaging the instrument or causing bodily harm.*

SIGNALTEK consumes power even when turned off. When not used for several days it is recommended that the batteries be removed from the handset to prevent accidental drain. As an alternative, a small piece of paper or plastic can be inserted between one of the batteries and an electrical contact to break the electrical circuit.

> *Alkaline batteries can leak when left in an electrical device for an extended period of time. This can cause damage to the electrical circuits in SIGNALTEK. Please take the actions above to prevent damage to your tester.*

SIGNALTEK's battery life indicator is calibrated for standard alkaline (1.5 volt) cells. Using rechargeable batteries will cause the

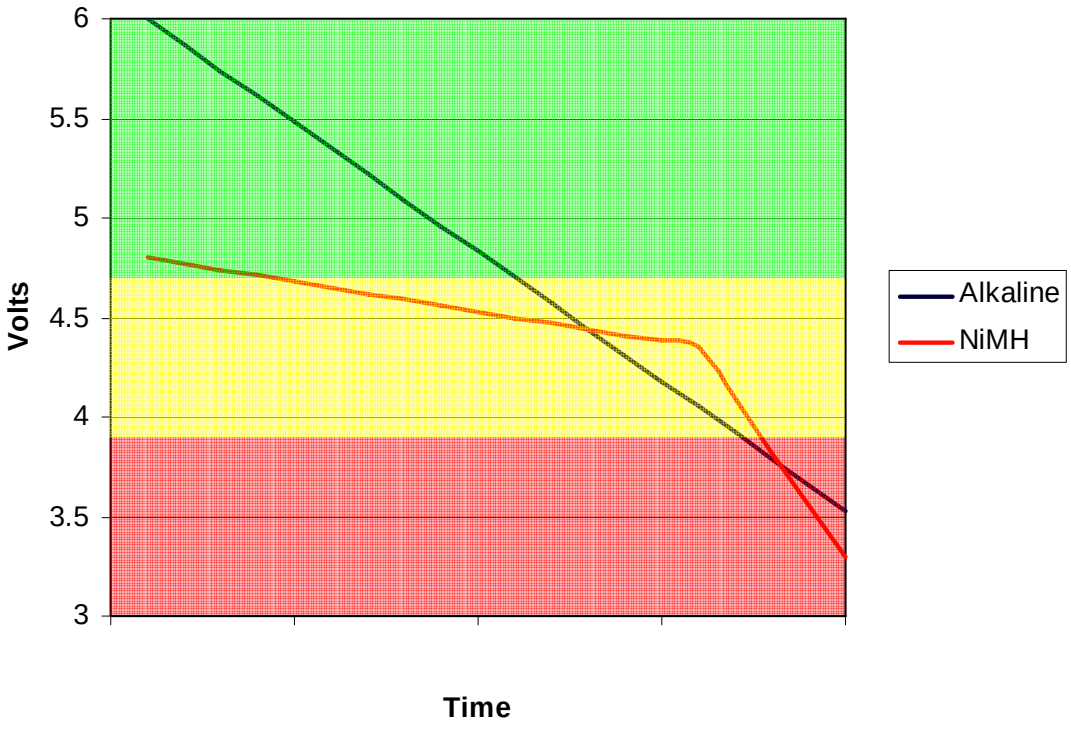
battery indicator to behave differently than it does with alkaline batteries because of the different cell voltage and discharge characteristics.

Alkaline batteries discharge in a linear fashion and the battery indicator will gradually change from green to yellow to red.

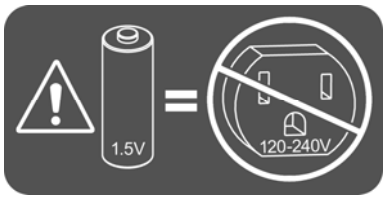
Rechargeable batteries such as NiMH have a lower starting voltage (1.2 volts per cell) and will hold a constant voltage for most of their life then suddenly discharge very rapidly.

When using NiMH batteries the indicator will remain green for a short time, and then turn yellow for most of the life of the batteries. Once the indicator turns red the pack is nearly completely discharged and the tester will turn off very shortly because of the discharged battery pack.

Figure 1-3 Battery Discharge Characteristics



Battery Charging Warnings



The DC power input port is not designed to charge batteries that are installed in SIGNALTEK. However, it is possible that a component failure may cause the unit to charge batteries causing the batteries to rupture, damaging the SIGNALTEK or causing personal injury.

To prevent accidental charging, IDEAL recommends that the external power adapters only be used when batteries are not installed in the tester.

Graphical User Interface Navigation

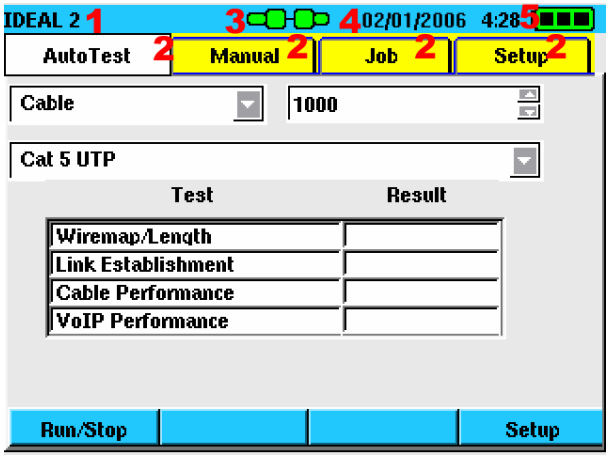
When turned on, SIGNALTEK will display the firmware version number then boot up to the AutoTest tab. This section of the manual will describe the various screens and the information displayed in each screen.

There are four primary display screens in the SIGNALTEK graphical user interface.

- AutoTest – Displays the tests that will be run when the Autotest button is pressed. Also lets the user choose the cable ID that will be used for the next test. Each time an Autotest is run the results are automatically stored to the internal memory in the active job file.
- Manual – Displays a listing of tests that can be run individually. Selecting a test with the up/down arrows then pressing F1 will run a test. Tests run from the Manual tab cannot be saved.
- Job – Displays a listing of current job files. Jobs can be added, edited, or deleted. Selecting a job and pressing Enter will display a list of tests stored in that job. Pressing Enter again will display the results of individual tests.
- Setup – Displays a listing of options for the operation of SIGNALTEK.

User Interface Navigation

Figure 1-4 AutoTest Tab - Active



Active Job (1)

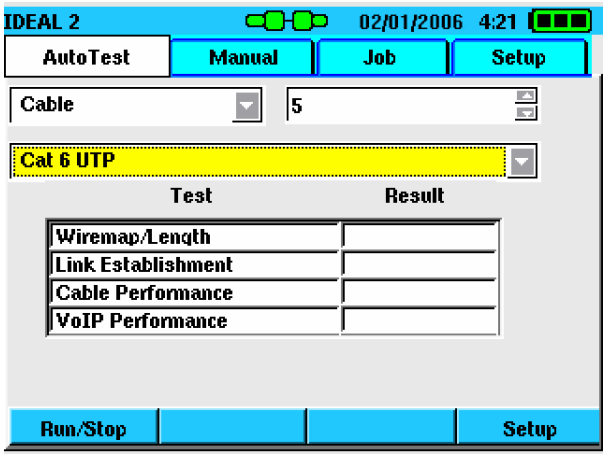
Function Tabs (2)

Link Status (3)

Date/Time (4)

Battery Status (5)

Figure 1-5 AutoTest Tab - Inactive



The

buttons are the primary method of navigating the user interface. In Figure 1-4, notice the color of the function tabs. The selected tab is white and the other tabs are yellow. This indicates that the tab navigation mode is active: pressing the left and right arrow keys will change between the four tabs.

Pressing the down arrow as depicted in Figure 1-5 changes the tab control to the inactive mode. The selected tab is white but the other tabs are blue. This indicates that tab navigation is inactive and pressing the left and right arrow keys will not change to a different tab. Each time the up or down arrow key is pressed the active item (highlighted in yellow) will change. **To change tabs, continue pressing the up or down arrow until the tab colors change from blue to yellow. This indicates that tab control is now active.**

Some fields in the user interface can be modified. To edit or change a field, press the up/down arrow keys until it is highlighted in yellow. Then press ENTER to activate or modify a selection. There are several options for user selectable fields:

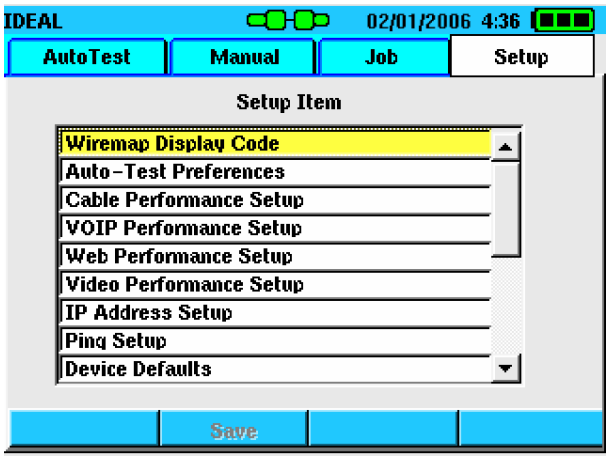
- Open a Window – Pressing ENTER on certain fields such as the Job names or Setup options will open a new window.

- Press ESC (#) to return to the previous screen without saving any changes. To save and return to the previous window press F2.
- Text Entry – Press ENTER to select the field, and then enter the text or numbers with the key pad. Press ENTER when finished.
- Pull Down Lists – Options like the cable ID name and some Setup preferences have multiple selections. Pressing ENTER on one of these fields displays a list of possible choices. Use up/down to highlight an option and press ENTER to select it.
- Select/Deselect Options – Where there is an option to select or deselect an option, highlight the field with the up/down arrows and press ENTER to place or remove the checkmark.

2 Setup and Configuration

The following section describes the various options that are available in the Setup tab.

Figure 2-1 Setup Tab



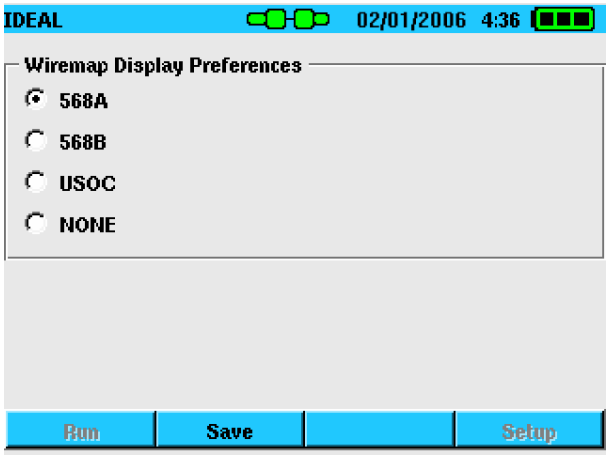
Wire map Display Color Code

The color display of the wire map can be set to one of three options: TIA 568A, 568B, USOC or None. Changing this option only affects the way the colors are displayed when viewing the wire map test result. It does not affect the actual result of the wire map test. Selecting either 568 A or B makes diagnosing wire map problems easier because the color of the conductor is correctly represented in the SIGNALTEK display.

Universal Service Order Code (USOC) is used when testing three-pair cables for voice applications. In this configuration the pairing sequence is:

Pair 1 (Blue) = Pins 4/5
Pair 2 (Orange) = Pins 3/6
Pair 3 (Green) = Pins 2/7

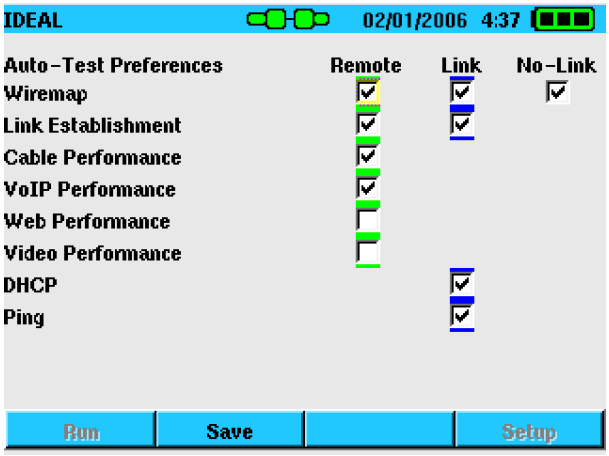
Figure 2-2 Wire map Display Preferences



Autotest Preferences

The Autotest Preferences screen determines which tests are run in any one of three line conditions: Remote, Link, and No-Link. SIGNALTEK continuously scans the line and when the Autotest button is pressed, it runs the selected tests as defined from the Preferences screen.

Figure 2-3 Autotest Preferences



Autotest Modes

SIGNALTEK will perform an Autotest in one of three link conditions:

- Remote – The SIGNALTEK display and remote handsets are connected to a single cabling link. All cable performance tests can be performed.
- Link – The SIGNALTEK display handset detects an active LAN link. The tester can perform several IP diagnostic tests to determine that network devices are operational and that the current port is properly connected to the LAN.
- No-Link – The SIGNALTEK display handset does not detect any device at the other end of the cable. This is an open ended test and a basic wire map and length test can be performed. In this configuration the wire map can only indicate if the cable pairs are open (normal) or shorted (abnormal), and measure the length of each pair with the TDR.

The current link condition is continuously displayed at the top of the SIGNALTEK display with a green, blue or red icon.

Figure 2-4 Remote Detected

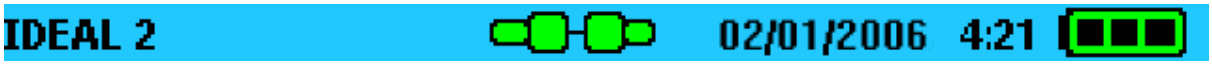


Figure 2-5 Active LAN (Link) Detected

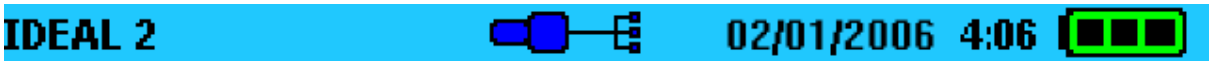
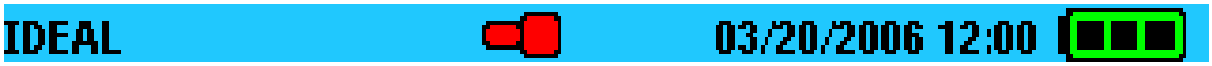


Figure 2-6 No Link Detected



The three link status icons are shown in the above images. Pressing the Autotest button will run the set of tests specified in the Autotest Preferences (Figure 2-3).

To enable or disable a test, highlight it using the arrow keys and press the ENTER button to add or remove the check mark. When finished, press F2 to save the changes or press ESC to return to the previous screen without saving.

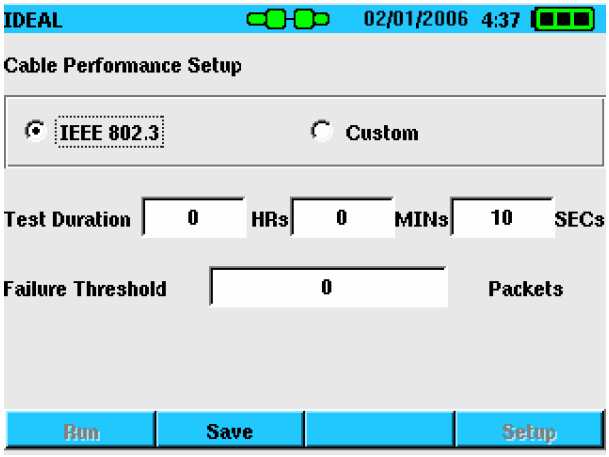
Cable Performance Setup

The Cable Performance Setup screen controls the test time and the pass/fail threshold for the bit error rate tests. There are four different bit error rate tests that can be run on SIGNALTEK.

- Cable Performance – This is the standard test that complies with the IEEE 802.3 specification for Gigabit Ethernet links. There are selections for 802.3 and Custom. The default 802.3 test runs for 10 seconds and allows no packet errors. The custom selection can be used to change the test time to run up to 24 hours with a user defined number of packet errors allowed.
- VoIP – This test transmits small 64kB packet that represents the type of information used in Voice over IP telephone systems. VoIP utilizes small packets that place an emphasis on latency (short delay) rather than packet size to maintain acceptable voice quality. The default value is 10 seconds but can be changed to any desired value.
- Web Performance – Simulates the type of large packet sizes that are typical of internet data transfers where large amounts of data are transferred.
- IP Video – Creates small random packets that are typical of IP Video systems such as those used for IP security cameras.

Of each of these tests, Cable Performance is the most critical and complies with the IEEE 802.3 specification for Gigabit Ethernet transmissions. The other tests can be optionally selected to create a more thorough test suite.

Figure 2-7 Cable Performance Setup

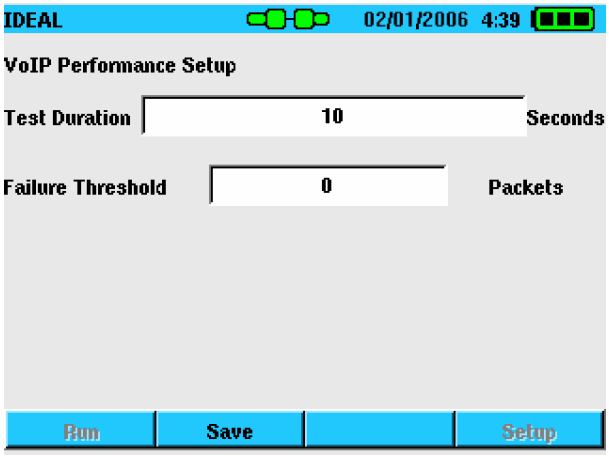


IEEE 802.3 is the default option. To use a custom value, select Custom and press ENTER. Then change the time and Failure Threshold fields as desired. The maximum values allowed are 23 hours, 59 minutes, and 59 seconds. Press F2 to save the settings.

When the IEEE 802.3 option is selected, the failure threshold is automatically calculated based on the time of the test. The minimum test time required is ten seconds to achieve a high degree of certainty that the link can support Gigabit Ethernet. In a ten second test there can be no error for the test to pass. If the test time is increased beyond ten seconds, more errors may be permitted based on the IEEE 802.3 specification.

Choosing the custom option allows a value for the failure threshold to be set manually, overriding the failure threshold calculated by IEEE 802.3.

Figure 2-8 VoIP Setup



The VoIP, Web, and IP Video setup screens are all similar. There is no IEEE 802.3 setting and the test duration is limited to 60 seconds. The default values for these tests are ten seconds and zero (0) packet loss.

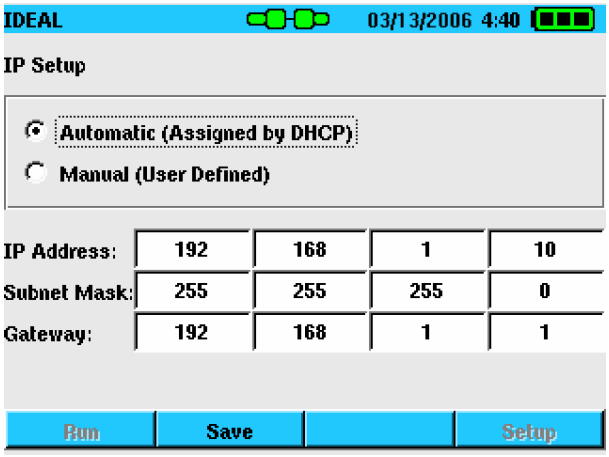
IP Address Setup

SIGNALTEK is an active IP (Internet Protocol) device and can be configured to operate as part of an Ethernet network.

By default DHCP (Dynamic Host Configuration Protocol) is selected as the method of obtaining an IP address. Most LANs use a DHCP server since managing IP addresses requires little or no time from the IT department.

A manual IP address can be configured if desired. One reason to manually set the IP address is to use the SIGNALTEK handset as a target to ping. For example if the cabling and server equipment is installed in a building, but there are no PCs in the work area the SIGNALTEK display handset can be configured with a known IP address and placed at the work station side of a network drop. Then the ping function can be used from the network server to ping SIGNALTEK and verify that it can communicate through the network switches and other active equipment.

Figure 2-9 IP Address Setup



When DHCP is selected, all IP functions will be handled automatically. The DHCP test can be run from either the Autotest or Manual tab. View the DHCP results to see the IP address assigned to SIGNALTEK as well as the IP addresses of the DHCP Server and Network Router

Ping Setup

SIGNALTEK can be configured to ping a network device as part of the Active Link test. This test verifies that communications can occur between SIGNALTEK and another device on the network.

The Network IP field in the Ping Setup screen is where the IP address of the device to be pinged is entered. This must be a valid IP address for a device on the network. Entering an address that is not assigned to a device which is currently on the network will result in a failed ping test.

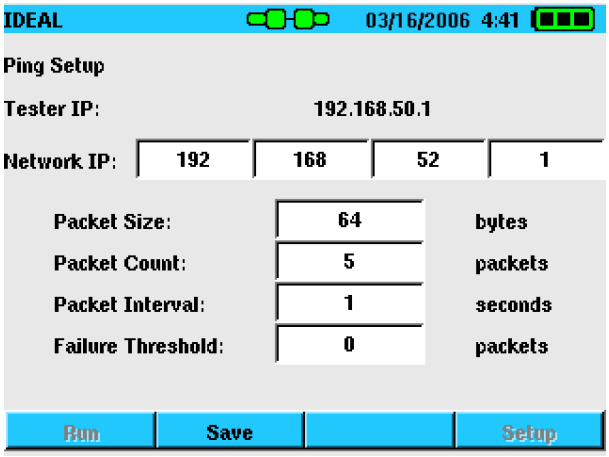
The packet size can also be specified. The allowable size is from 64 to 1518 bytes. 64 bytes is the default setting.

Packet Count specifies how many packets will be transmitted during the test. The default value is five packets.

Packet Interval specifies the delay in seconds between ping attempts. The default value is one second.

Failure Threshold specifies the number of lost packets allowed before the test is tagged as a “Fail.” The default setting is zero (0) failures.

Figure 2-10 Ping Setup



In a business network the ping test might be used to check the connection between an office and a server or networked printer.

In a residential network the ping test can be used to verify communications with network cameras, computers or home-automation devices that communicate via IP.

Device Defaults

The device defaults option lets the user specify the default setting for the cable type and NVP used when creating new jobs. For example, if Cat 5e UTP is selected, this will be the cable type used for all tests in a new job unless it is changed to another type. The NVP (Nominal Velocity of Propagation) is a value that is specified by cable manufacturers. This specifies the speed of an electrical signal traveling through a cable and is measured as a percentage of the speed of light. For example, 0.70 means that the signals are traveling at 70% of the speed of light. This setting is used to calculate the correct length measurement with the TDR.

Typical settings for NVP are 0.68 for non-plenum (PVC jacketed) cable and 0.72-0.75 for plenum rated cable. The correct setting for

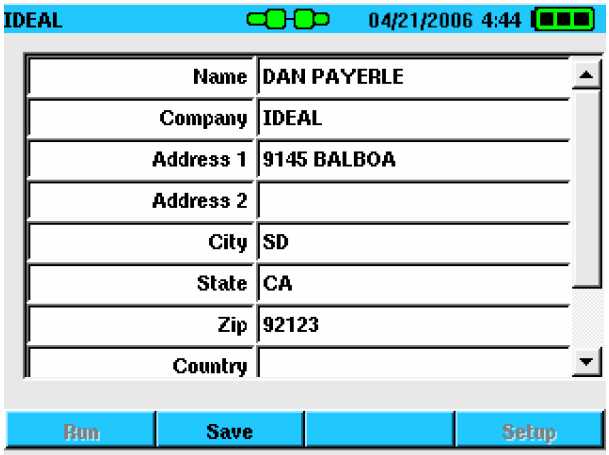
each cable can be found on the cable data sheet provided by the cable manufacturer.

Owner Information

The Owner Information screen is where the personal data about the SIGNALTEK owner/operator is entered. This data is stored for each job and is saved/printed on the header of the SIGNALTEK cable performance reports.

If this information is left blank, the accompanying header information on the printed reports will also be blank.

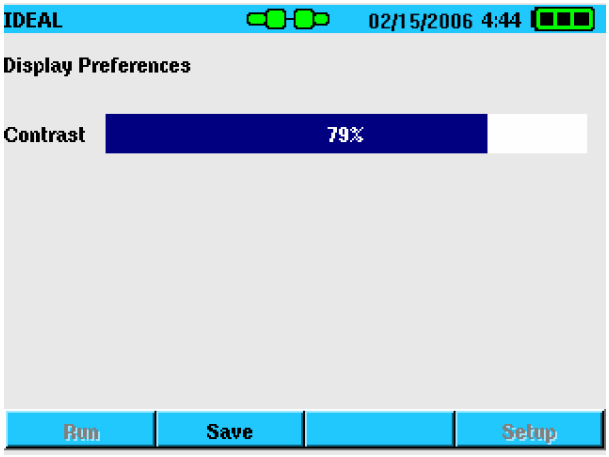
Figure 2-11 Owner Information



Display Preferences

The Display Preferences screen allows the contrast level of the color LCD to be adjusted. The LCD is sensitive to temperature changes and the contrast level may need to be adjusted when operating the tester in very warm or cold conditions. Use the left and right arrow keys to adjust the contrast to an acceptable level and press F2 to save the settings.

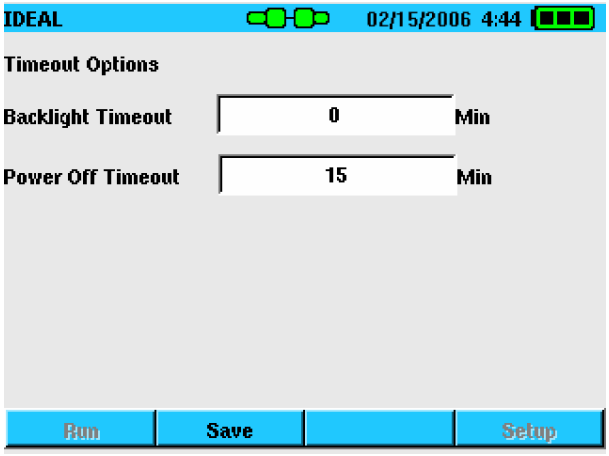
Figure 2-12 Display Contrast



Timeout Options

The Timeout Options screen is used to set the time that the display backlight and handset stay on during periods of inactivity. Entering “0” prevents the display or handset for automatically turning off.

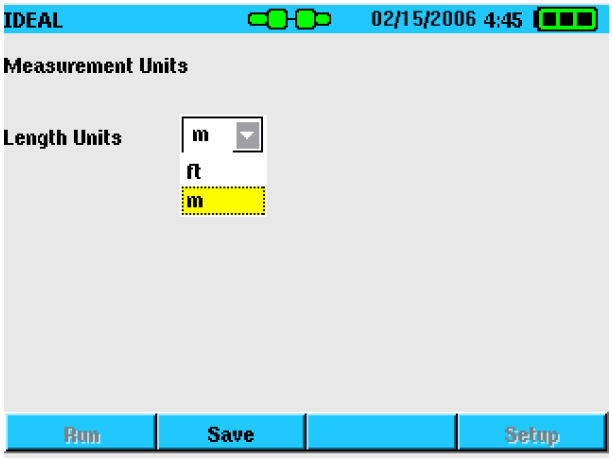
Figure 2-13 Timeout Options



Measurement Units

This function controls how the cable length measurements are displayed. The options are feet (ft) or meters (m).

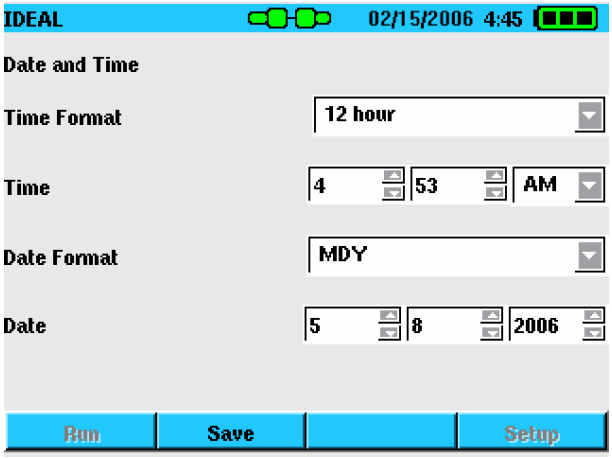
Figure 2-14 Measurement Units



Date and Time

The tester includes a real-time clock to mark the date and time of each Autotest. When the batteries are removed the internal clock will operate for approximately 24 hours, after which the date and time will need to be reset.

Figure 2-15 Date and Time



Cable ID Prefix

The cable ID Prefix function is used to add a name to the cable ID for stored tests. There are several preset names in the cable ID Prefix which are accessed through the pull-down list in the Autotest tab. However, there are many instances when an installation may require the use of a name that is not in the preset list. For example, when installing cable in a home the list can be updated to include the names: “DEN, THEATRE and KITCHEN”.

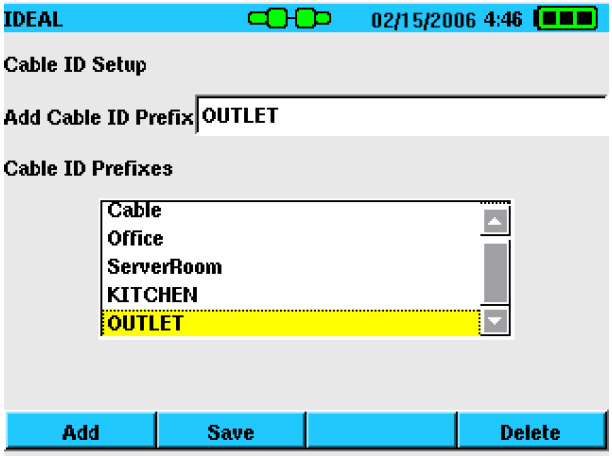
The Cable ID Prefix screen allows names to be added or removed from the list to suit each situation. To add a name to the list:

- Move the cursor to the “Add Cable ID Prefix” line and press Enter. Type in the desired name and press Enter again.
- Press F1 (Add) to add the new name to the list.
- Press F2 (Save) to confirm the addition of the new name.

The new Cable ID prefix will now appear in the Autotest tab and can be used on any future test.

Names can also be deleted from the Cable ID Prefix list by highlighting the name and pressing the F4 (Delete) key.

Figure 2-16 Cable ID Prefix Setup



Language

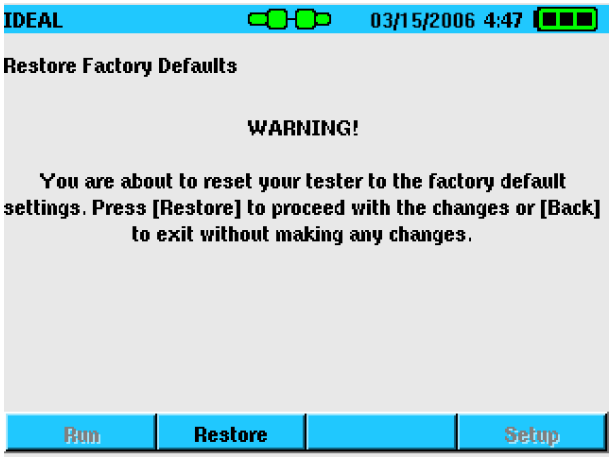
SIGNALTEK can support a variety of languages. To change the language, choose an option from the pull-down list and press Enter. For the new language to take effect the tester must be turned off and back on.

Figure 2-17 Language Setup

Restore Factory Defaults

Restoring the factory defaults will reset all of the user preferences back to the original factory settings. Restoring the defaults will not delete any saved test data.

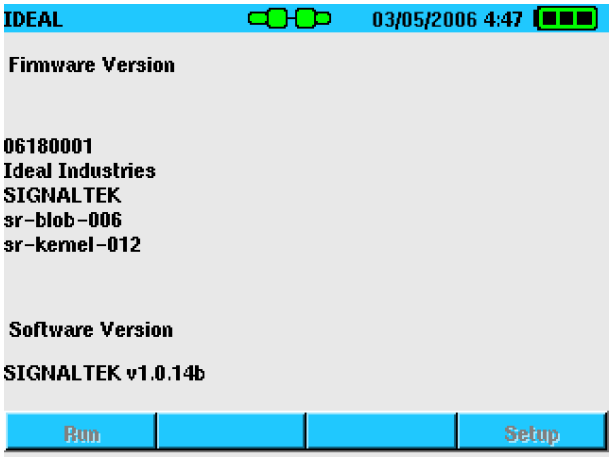
Figure 2-18 Factory Defaults



Updating Firmware

The Firmware Version screen displays SIGNALTEK's current firmware. The firmware can up updated by downloading a new file from IDEAL's website: www.idealindustries.com.

Figure 2-19 Firmware Version



To install a new version of firmware:

- Download the new file and save a copy of it onto a USB memory drive.
- Connect the Display and Remote handsets together with an RJ45 patch cord. If necessary, the display handset will update the firmware on the remote handset via the RJ45 port.
- With SIGNALTEK powered off, insert the drive into the USB port.
- Turn on SIGNALTEK and watch for the message that indicates a firmware update is in progress.
- When SIGNALTEK shuts off the update is complete and the USB memory drive can be safely removed.

> *Note: The firmware update file is not deleted from the USB drive after the update process. If SIGNALTEK is rebooted with the USB drive in place it will re-update the tester. To prevent this,*

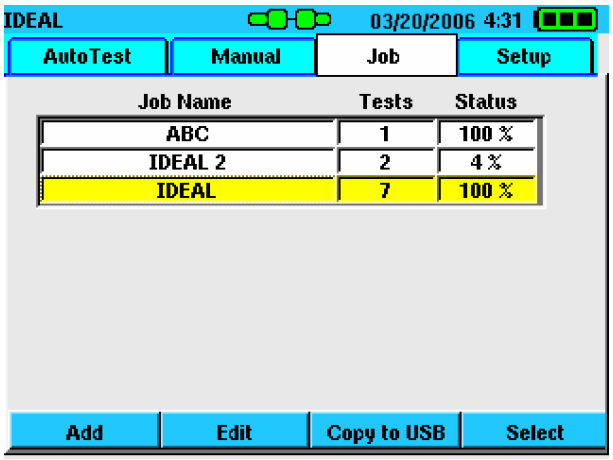
delete the file from the USB drive after updating the tester. However, if you are updating several SIGNALTEK testers, you can simply take use the same USB drive to update all the testers then delete the file when finished.

Note: Do not remove the USB drive while an update is in progress. Doing so may corrupt the on-board Flash memory, which will require factory service. Wait until the SIGNALTEK graphical user interface is displayed before disconnecting the drive.

Using the Job Tab Functions

The Job tab contains a listing of jobs that are used to organize stored test data. The default job name is “My Job.” Additional job names can be created to allow the user to organize stored tests by worksite, building, customer, project, or whatever system works best. From this screen job can be created, viewed, edited and deleted.

Figure 3-1 Job Tab



- Job names are limited to 12 alpha-numeric characters. Some special characters such as “$, #, &” and commas are not allowed in the job name.
- When a new job is created, it becomes active and any new tests are stored in that job until another job is selected as the active job. For quick reference, the active job is displayed in the upper-left corner of the display.
- Press the “Add” function key to create a new job. At a minimum, the Company Name must be filled in since this becomes the job name. All other fields are optional. However, most of the information here is printed on the header of the

report. Therefore, leaving blank fields may generate reports that look incomplete.

- Highlight a job name and press Enter to view a list of the tests stored in that job. Press Enter again to view the details of the saved test.
- Highlight a job and press the “Select” function key to make it the active job. All autotests will be saved into this job until a different job is made active or a new job is created.
- Highlight a job and press the “Delete” function key to delete the job and all of the tests in that job.

  Deleting cannot be undone. Only delete a job when you are certain that the records are no longer needed.

- Overall test storage is approximately 20,000 records on the internal memory.
- Individual jobs are limited to 500 autotest records each.
- The “Tests” column in the job tab displays the number of tests that are stored in each job.

In addition to the name and address information that can be stored in each job, there is also an entry for the number of cables in the job. If a number is entered into this field it will be used to track progress of each job on the job list screen. For example, if the number of cables entered is 100 and 50 autotests have been saved in that job, the status line will read 50%.

Printing and Copying to USB Drives

SIGNALTEK test files are created in a format called XML (Extensible Markup Language). This is a more powerful version of HTML which is used to code internet pages for viewing with a web

browser. By using XML, test reports generated by SIGNALTEK can be viewed with any PC that has a web browser installed.

There are three ways to access stored test files from the SIGNALTEK display handset. The files are stored on internal, non-volatile memory which will hold its data even when the batteries are removed. The data can be accessed by:

Direct PC Connection (Windows XP™ only)

- Connect the included USB cable between the bottom (mini) USB port on SIGNALTEK and an available USB port on the PC.
- Windows will recognize SIGNALTEK as a USB mass storage drive. On the computer, choose the option to “Open folder to view files”.
- Go to the Reports folder to see a listing of the stored job files.
- Double-click on a test file to open it with the default web browser
- Print the desired test reports to an attached printer.

Copy to External USB Drive

The ability to copy job files to a USB drive provides a great amount of flexibility when working with stored data. USB memory drives provide an easy way to back up test data, give it to a customer, or transport it to an office without taking the tester out of the field.

- To copy a job to an external USB memory drive, connect the drive to SIGNALTEK’s top USB port.
- Highlight the desired job. Press the “Copy to USB” function key to copy the job file to the USB drive.
- The job file and a file called “SIGNALTEK.xsl” will be copied to the USB drive. The XSL file is called a “style-sheet” and instructs the web browser how to display the test file.

Note: If sending the file to another person by email or another method, make sure to copy the "SIGNALTEK.xsl" file in addition to the test file so the records can be properly viewed on the other PC.

Printing Directly to a USB Printer

SIGNALTEK is the only LAN Qualification tester that can print reports directly to a USB printer. Because SIGNALTEK uses the Linux operating system, not all USB printers are supported. Please check IDEAL's website for a list of compatible printers. At the time of this writing only HP printers have been found to support the Linux native PCL driver included in SIGNALTEK.

- To print a job to a compatible printer, connect the printer to SIGNALTEK's top USB port. A USB "A to B" cable is required for direct printing. These cables are available at any electronics or computer store.
- Change to the Job tab and highlight the job to be printed.
- Press the "Print" function key to send the job to the printer.

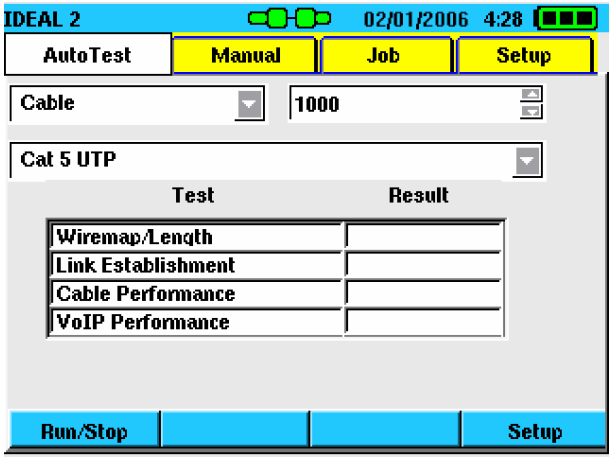
Note: All tests in the selected job will be sent to the printer. The user interface will remain locked while the job is being sent to the printer.

Figure 3-2 USB Printer Cable

4 *Running Autotests*

The Autotest tab displays a listing of the tests that will be run with the Autotest button is pressed. The listing will change depending on the link status (indicated by the link status icon at the top of the screen) and the options selected in the Autotest Preferences screen.

Figure 4-1 Autotest Tab



The Autotest list will automatically update as the link status changes. When testing with the SIGNALTEK remote the link status icon will change to green when the remote has been detected.

Pressing the Autotest button before the remote is detected (red link icon) the no-link test will run, only checking the wire map and length.

In addition to the link icon on the display handset, the “LINK” LED on the remote handset will also light green if it detects the display handset. This makes single person operation easy since the operator will always know that the SIGNALTEK display and remote handsets are connected to the same link before starting an autotest.

Beginning an Autotest

There are three modes of autotest operation; Remote, Link, and No-Link. Details of each operation mode are described on page 2-3.

Connect each of the SIGNALTEK handsets to the link to be tested. Qualification testing is performed with both SIGNALTEK handsets. Active LAN testing is performed with only the display handset and is generally done as troubleshooting or as a final check of active devices on the network.

- When properly connected the link status indicators on the display and remote will both change to green.
- Select the proper cable type from the pull-down list on the Autotest tab. Make sure that the UTP/STP option is correct as selecting STP while testing UTP cables will lead to wire map failures when the shield is not detected.

  Note: The cable type selection is a descriptive function only for Category 5-7 Cables. Choosing Cat 5e versus Cat 6 will not affect the cable performance results. However, choosing a Coax or 2-wire cable type will prevent the cable performance tests from running since the required number of conductors are not available (see Table 1-2).

- Press the Autotest button on either handset to start the test.
- The test list will display one of several messages for the status; “Running”, “Pending”, “Pass”, “Fail”, and the link speed for the Link Establishment test.

  Note: Results for tests that have been completed may be viewed even while other tests are still running.

When the autotest is complete, the status indication for all tests will indicate “Pass”, “Fail” or link speed. The STATUS LED on the remote handset will light green if all tests passed and red if any test failed.

All autotest results are saved regardless of their pass/fail status. If re-testing a failed cable is necessary, change the cable ID to the name of the existing test and press the Autotest button. A message box will warn that the cable ID already exists. Use the left/right arrow keys to choose the “Yes” option and press Enter. This will overwrite the existing test data with data from the new autotest.

Stopping an Autotest

When an autotest is running, each of the individual tests in the suite is processed individually. Pressing the F1 function key will interrupt the test suite after the current test is finished running.

Active Link Testing

When in the Active Link mode (see page 2-2) pressing the Autotest button will begin a series of Active LAN tests. While in this mode the following tests can be run:

- Wire map – Displays the wire map and the length of the cable.
- Link Establishment (described on page 5-2)
- DHCP Test – This function attempts to locate a DHCP server (also known as an IP address server) on the local network. If discovered, SIGNALTEK will request an IP address from the network. Successful negotiation of an IP address indicates that SIGNALTEK is able to communicate on the network and that the cabling can support IP traffic.
- Ping Test – Used to send packets to a device on the network to check its response. To ping a device, the network address of the device must be known and entered into the Ping setup screen (see page 2-7).

Note: The ping test is a low speed packet test. It is not similar to the cable performance bit error rate tests that transmit many thousands or millions of packets in a short period of time. Pinging a device does not guarantee that the cabling between the SIGNALTEK display handset and the device can sustain network transmissions at full gigabit data rates.

No-Link Testing

SIGNALTEK can perform a basic wire map and length test on un-terminated cables. This is called no-link testing and is indicated by the red link indicator at the top of the display. The red link indicator signals that the display handset is not detecting any type of active device at the far end of the link: neither the SIGNALTEK remote nor an Ethernet device is present.

Pressing Autotest will run a wire map/length test on the connected cable. Normally when a cable is tested from one end, the termination condition on the wire map screen should indicate an open condition and the length of each pair. A shorted indication means that there is a problem either in the cable or at the connector, and the distance to the shorted pair will be displayed.

Manual Tests

The Manual test tab is used to run tests individually rather than as an autotest. To run a manual test, use the up/down keys to highlight a test then press F1 to start the test.

Manual tests cannot be saved and are typically used as a quick diagnostic test when troubleshooting.

5 *Test Results*

There are three categories of tests results that SIGNALTEK will display: wire map/length, Bit Error Rate, and active network. This chapter will explain the results of each type of test.

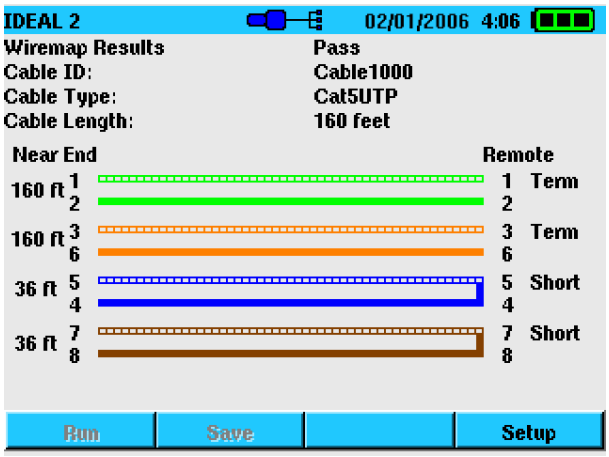
Wire map Results

The wire map screen displays the results of the pair test as detected by the Gigabit Ethernet chip-set. The wire map test can detect shorted, opened, reversed, and terminated pairs. To the right of the wire map diagram the words “Open, Short, or Term” will be presented to indicate the condition of each pair.

If a pair is opened or shorted, the TDR will measure the length of that pair and display it to the left of the pair diagram.

Near the top of the screen the Cable Length will be displayed as estimated by the DSP (Digital Signal Processor). This length is displayed in 25ft (8 meter) increments.

Figure 5-1 Wire map Results



Note: When all four pairs are properly terminated, the TDR is unable to obtain a strong reflection from the remote end of the cable which is necessary for a TDR measurement. In this case, the on-board DSP will measure the cable length.

When there is a cable fault (open or short), the TDR will automatically display the distance to the fault with an accuracy of ±3ft (1m).

Wire map Testing Active LAN Links

Running the wire map test on active LAN links can produce results that indicate a wire map failure when there is none. Most 10/100Mbps Ethernet switches internally short the unused pairs (4/5, 7/8) since they are not used at these speeds. In this case, SIGNALTEK will detect the shorted pairs at the switch. This is not a cabling problem; the tester is simply detecting the internal short on the switch. The benefit is that since a short has been created, the TDR can accurately measure the distance to the switch.

Gigabit switches use all four pairs. Therefore, shorts will not be indicated when performing a wire map test into a Gigabit Ethernet device. In this case, the length information will be estimated from the Gigabit DSP.

Link Establishment

Link Establishment displays the connection speed of the active device at the other end of the cabling link. Possible link speeds are 10/100/1000Mbps. This is the maximum speed of the other end of the link. The actual network bandwidth may be less than the link speed.

Link Establishment also displays the MDI/MDIX results for the link. Normally, Twisted Pair ports must be connected so that the Transmit pair on one end is connected to the Receive pair on the other end, and vice versa. If the cabling is done so that Transmit on one end is wired to Transmit on the other, and Receive is wired to Receive, the link will not display.

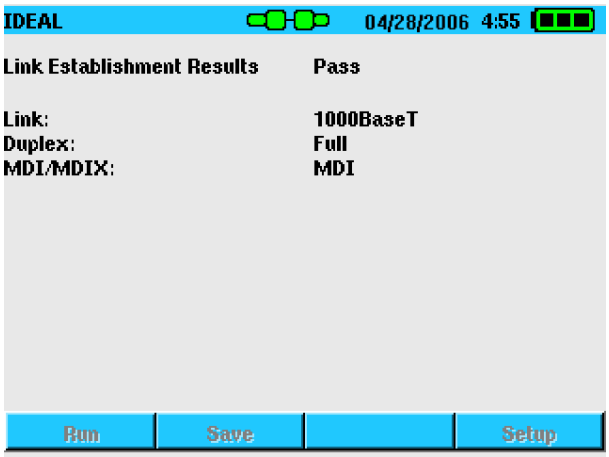
Hubs and switches are deliberately wired opposite of the way PC network cards are wired, so that when a hub or switch is connected to a PC, a "straight through" Ethernet cable can be used and the

pairs will match up properly. When two hub/switches are connected to each other, or two PCs are connected to each other, a "crossover" cable is used to make sure that the correct pairs are connected.

The standard wiring for PCs is known as "MDI" (Media Dependent Interface), and the standard wiring for hubs and switches is known as "MDIX" (Media Dependent Interface with Crossover).

The result from the Link Establishment test indicates the type of device to which SIGNALTEK is connected. MDI means that SIGNALTEK is connected to a PC while MDIX means that it is connected to a hub or switch.

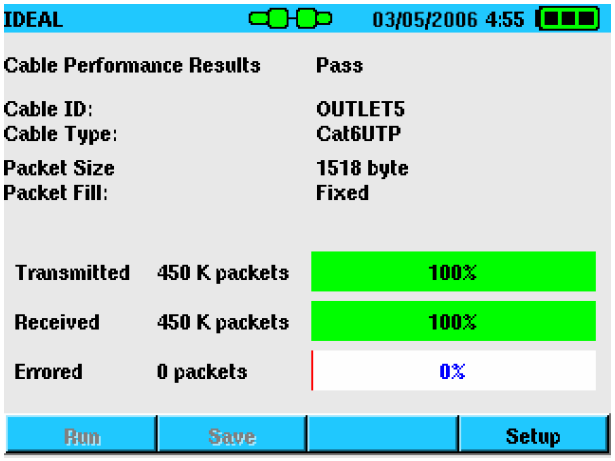
Figure 5-2 Link Establishment Results



Bit Error Rate Tests

The Cable Performance, VoIP, Web, and IP Video tests are all similar in that they utilize the Bit Error Rate Test function of the Gigabit Ethernet chipset to test a link's ability to support network traffic at certain speeds without losing information. The primary differences between these four tests are the packet size and fill type. The Cable Performance test is the only test that has an option to automatically set the failure threshold (pass/fail limit) in accordance with IEEE 802.3 guidelines.

Figure 5-3 Cable Performance Results



The results screens for the Cable Performance, VoIP, Web and IP Video tests all display the following information:

- Results – Indicates Pass or Fail. Fails when the number of errored packets is greater than the number specified in the Setup options for that test type.
- Cable ID – Displays the ID of the saved autotest.
- Cable Type – Displays the selection specified in the Autotest/Manual tabs when the test was run.
- Packet Size - Displays the packet size transmitted during the test. Either 64 bytes or 1518 bytes depending on the test run.
- Packet Fill – Displays the type of data used to fill the test packets. Fixed mode uses an alternating series of “1’s” and “0’s.” Random mode uses a random series of “1’s” and “0’s.”
- Transmitted – Displays the number of packets transmitted during the autotest.
- Received – Displays the number of successful packets that were received during the autotest. The bar graph indicator provided a quick glance of the test results.
- Errored –Displays the number of packets that were lost or re-transmitted due to packet errors. A good link will have zero (0)

packet errors, indicating that the bit error test was 100% successful.

Performance Test Failures

Errors during the performance tests indicate a potential problem with the cabling, connectors or installation environment. The typical cause for errors is a low signal to noise ratio (SNR) or low attenuation to crosstalk ratio (ACR), meaning that crosstalk (ACR) or external noise (SNR) is at a level that the gigabit noise canceling circuitry cannot remedy.

The first step in troubleshooting a performance test failure is to check the quality of the termination at the work station and patch panel. Installation guidelines allow for no more than ½" of untwist in each pair and no more than 1" of jacket to be removed at each termination. Excessive untwisting can lead to high Near End Crosstalk (NEXT) within the cable and an unacceptable ACR.

Ensure that all the components in the cabling system are rated to at least Category 5e or ISO Class D by the manufacturer. Lesser quality components may not provide the necessary performance margins required for successful gigabit Ethernet operation. Also check that the equipment patch cords are also rated to Cat5e/ISO-D and that the RJ-45 modular plugs are terminated in accordance with the TIA-568 A/B specification (see Figure 1-1). Some low-quality patch cords are terminated with a "straight through" configuration that causes excessive crosstalk and will not support operation at gigabit or sometimes even 100Mbps data rates.

The IEEE specifies the maximum operational distance limit of 10/100/1000 Mbps Ethernet as 100m (328ft). While it is possible for a link to operate at greater distances, the attenuation of the link increases in direct proportion to the length. Another factor affecting the SNR is the temperature of the cable: as the temperature increases, so does the attenuation of the cable. Accordingly, in very hot locations, links at 100m or less in length may still exhibit

excessive attenuation. Increased attenuation will reduce the SNR of the link and lead to bit errors.

6 *Fiber Optic Testing*

Overview

SIGNALTEK is available with a fiber optic testing option. The SIGNALTEK-FO has incorporates additional hardware to support fiber optic testing via Small Form Factor (SFP) modules. These modules are commonly used in high-performance network switches to provide high-speed backbone links over long distances and have been incorporated into SIGNALTEK-FO to provide a low cost method of qualifying fiber optic links.

SIGNALTEK-FO modules are equipped with a SFP slot in each handset that can accommodate an SFP module supplied by IDEAL Industries. There are two SFP modules available. The SFP-850 modules are multimode units that operate at a wavelength of 850nm. The SFP-13X0 modules are compatible with both multimode and single mode fiber and operate at a wavelength of 1300nm.

It is typical that multimode fiber optic devices that operate in the 1300nm window are identified as 1300nm devices and that single mode devices that operate in the 1300nm window are identified as 1310nm devices even thought the operating wavelengths are the same. This difference in naming is used solely to identify the multimode or single mode compatibility of the device.

The IDEAL 1300nm SFP modules are compatible with both multimode (1300) and single mode (1310) cabling and are therefore identified as 13X0 to indicate their compatibility with both types of fiber.

SFP Compatibility

SIGNALTEK-FO is compatible only with SFP modules supplied by IDEAL Industries. While other SFP modules will fit into the

SIGNALTEK handsets, they will not be recognized by SIGNALTEK and tests will not run.

Fiber Qualification Abilities

When qualifying fiber optic cabling, SIGNALTEK-FO operates in a manner very similar to the standard SIGNALTEK. The tester will run cable performance tests to qualify a link as being able to support Gigabit Ethernet at an acceptable bit error rate and will perform a link establishment test to verify link speed and measure the attenuation of the link. The length of the cable cannot be measured on fiber; this function is only available on copper cabling.

The physical interface for the fiber port is the LC duplex connector. This is a standard small form-factor connector that allows two fiber cables to be connected in the space of a single ST or SC connector.

Figure 6-1 SIGNALTEK-FO Top Connectors

SIGNALTEK-FO kits ship with LC-to-SC multimode jumpers that allow testing of 50μm and 62.5μm fiber. Testing of ST or FC and single mode cabling can be accomplished by purchasing the appropriate jumpers and couplers.

Figure 6-2 LC-to-SC cable

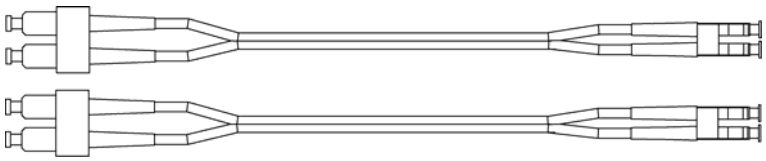
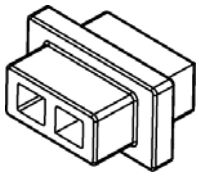


Figure 6-3 SC Coupler



LED Indicators

The LED indicators on the top of the Display and Remote handsets indicate the condition of the laser and detector. The Tx LED will light red when the Laser in powered on in the respective handset. The Rx LED will light green when light is detected at the receiver of the respective handset. Whenever the red LED is on, laser energy is being emitted and care should be taken to not look into the SFP port or the fiber optic connectors.

Turning the Laser On and Off

When in the fiber optic mode the laser transmitter in the Display handset can be turned on or off by pressing the F2 soft key. When not in use, turn the laser off to prevent accidental eye injury. When the laser is on the LED will light red and a red triangle will flash on the display.

The Remote handset's laser is always off unless it detects a signal from the display handset. When a signal is detected, the green LED will light, and then the laser will turn on as indicated by the red LED.

The LEDs also serve as a polarity indicator. When connected to a link with the correct polarity, both the red and green LEDs on each handset will be lit. If only one of the LEDs is lit when connected to a

link there is either a polarity mismatch or one of the fibers connected between the two handsets is not transmitting light.

Setup and Calibration

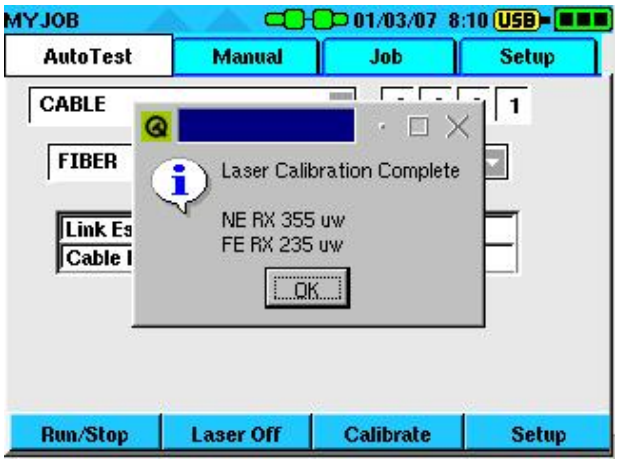
Before testing fiber the display and remote handsets need to be calibrated so that the correct attenuation values are calculated. Failure to perform the calibration will result in inaccurate attenuation values shown in the Link Establishment screen; however the results of the bit error rate tests are not affected.

1. Choose FIBER from the cable type pull down menu to put the SIGNALTEK into the fiber test mode. Connect the LC-SC patch cord to each handset and use the provided SC coupler to join the two patch cords.

Figure 6-4 Calibration Setup

2. From the Autotest or Manual tab, press the Calibrate softkey. The two handsets will read the power output of the other handset and display the results when complete. Press the ENTER key to clear the calibration message

Figure 6-5 Calibration Complete Screen



3. Run an Autotest or choose the Link Establishment test from the Manual tab to see the results of the test.

Figure 6-6 Fiber Link Establishment

The Link Establishment screen displays the link speed, duplex configuration and information about the power loss. The power loss portion of the screen displays the calibration value in micro watts (RX Cal), the power measurement during the test in micro watts (RX), and the computed loss value in micro watts and decibels (Loss).

Note: The fiber optic modules will only link at 1000Mbps. They will not drop to 100 or 10Mbps on low quality links as the copper test will.

7 *Troubleshooting & Frequently Asked Questions*

Failing DHCP Tests

Upon performing a wire map test, SIGNALTEK sends a low voltage pulse down the cable to detect the presence of a short or open condition. Many Cisco® (and possibly other brand) switches will detect this pulse and temporarily de-activate the port. When this happens SIGNALTEK will be unable to request an IP address and the DHCP and Ping tests will fail.

To prevent this from occurring, go to SIGNALTEK's Autotest Preferences screen and de-select the Wire map test. Doing this will allow the Link Establishment, DHCP, and Ping tests to function normally.

Failing Wire map when testing active LAN links

Most 10/100 switches and PC interface cards internally short or ground the unused (4/5 and 7/8) pairs to prevent EMI/RFI on the cable. SIGNALTEK detects these shorts and notifies the user of their presence. This is a function of the Ethernet device and cannot be changed, but it does not represent a cabling problem. A short on the 1/2 or 3/6 pair is critical since this indicates a cabling fault and needs to be corrected.

Wire map/length passes with no cable connected

In the no-link (open ended) configuration, SIGNALTEK expects to see an open condition for each conductor. In this test, there is no minimum cabling length required and the test will only indicate a failure when a short is detected.

What type of testing is available on coax and non-data cables?

Coax cables can only be tested for length and wire map (open/short/terminated) because only one physical pair (center conductor and shield) is present. At least two pairs are required to perform an Ethernet cable performance test.

When testing two-or three-pair cables such as telephone, speaker, or alarm wire a wire map, length, and cable performance test can be run. However, for the cable performance test to run the cable must be terminated in accordance with the TIA 568-A/B wiring configuration (see Table 1-1 Ethernet Signaling).

> *Note: While it is possible, attempting to run a cable performance test on alarm or flat telephone wire may result in a failed link establishment or BERT because of excessive crosstalk in cables that are not twisted at a rate to support 10Mbps or higher data rates.*

How does monitoring mode work?

Monitoring is similar to a very long autotest. In the interest of productivity, the default test time (minimum required by IEEE) is ten seconds for the cable performance test. When manually configuring a longer test time such as several minutes or several hours, the likelihood of discovering bit errors during the cable performance tests increases. Statistically, the longer the device is transmitting data, the more likely an error will occur.

Monitoring mode is an alternative troubleshooting device, and should be used when the user believes that there is a problem with a particular cabling link, even though a brief autotest passes without any bit errors. Running a longer test may capture errors that are a result of environmental conditions such as sources of intermittent electrical noise that interfere with data transmission on the network.

Monitoring can only be done on a link with the SIGNALTEK handsets attached to both ends of the link. There is no ability to connect to an active network and perform bit error tests.

To what standard does SIGNALTEK test?

The IEEE 802.3x standard is the international specification for Ethernet transmissions over a variety of media. Specifically, the 802.3ab standard defines the requirements to transmit Gigabit Ethernet over twisted pair copper cabling. Part of this standard includes specifications for allowable bit or packet errors specified period of time.

Unlike the TIA/ISO/IEC cabling standards that define the installation and electrical testing requirements of a cabling system, the IEEE standard is concerned only with the active transmission of data. Certifying a cabling link to a TIA/ISO/IEC standard guarantees that a variety of communications protocols can be run. However, certification test equipment that is required for this type of testing can be prohibitively expensive for use in small commercial and residential networks.

In these smaller networks, the prime concern is that high-speed Ethernet be able to run without errors on every link. SIGNALTEK's Gigabit bit error tests are used to qualify a cabling links ability to support high-speed data transmissions.

How can I troubleshoot network problems with SIGNALTEK?

The primary function of SIGNALTEK is to qualify cabling to support high-speed data applications. When IT professionals need to install additional cabling links because of growth in their environment, the only tools previously available to test the cabling were wire map verifiers or full cable certifiers. The verifiers do not provide any performance information about the cable and cable certifiers are typically not available due to the cost and infrequent need to use one. SIGNALTEK provides a low cost method of checking the performance of newly installed cabling.

Also, in many instances in-house IT staff may have access to old installed cabling that they want to use for new applications. A cable qualifier can quickly determine if the existing cabling is able to support Gigabit applications.

SIGNALTEK's active LAN features can also be used to diagnose cabling or network problems that may not be cable related. The link establishment, DHCP and ping functions are three of the most common software tools used to troubleshoot networks. In the event that a user cannot access the network, the DHCP test can be quickly run at the user's workstation to determine if the problem is in the network or with the user's computer.

The following steps can be used to troubleshoot a problem work station:

- Disconnect the patch cord from the PC and connect to SIGNALTEK. When the link status icon changes to blue, press the Autotest button.
    - A successful Link Establishment, DHCP, and Ping test indicate that the network is fully functional.
    - A failed link establishment test means that the cabling may be damaged to the point where even a 10Mbps link could not be negotiated.
    - A failed DHCP test indicates that the DHCP server may not be responding to requests at all or in a timely manner. Some network viruses have the effect of slowing down DHCP requests to the point where users are unable to log onto the network.
    - A failed ping test can indicate several problems depending of the address that the user is attempting to ping.
        - Pinging an external (internet) address provides the best diagnostic information because this verifies that your internal network is successfully passing

data through the router to the internet. However to do this you must know the address of an internet server. To determine the IP address of an internet server do the following:

- Go to a PC, Click on Start, Run, then type “cmd” and press Enter.
- At the command prompt type “ping xxxxx.xxx” and press Enter. *Where xxxxx.xxx is the name of a well known website.*
- The resulting data will give you the IP address of the internet server which can be entered into SIGNALTEK.

- Pinging and internal address is convenient if you want to check the response of a network server, router, or other known device.
- If a ping test fails, make sure that a valid IP address is configured in the ping Setup screen.

- If the link status icon stays red when connected to the network outlet, a basic connection problem exists between the SIGNALTEK and the network switch/hub.
- First try a different patch cord. The user’s patch cord may be damaged, preventing any communication between the computer and switch.
- If the link is still down after trying a new patch cord then it is likely that the patch cord in the telecom room between the user’s outlet and the switch has become disconnected.
- If all tests pass, connect the SIGNALTEK directly to the user’s PC with a patch cord and go to the Manual test tab. Highlight Link Establishment and press F1.
- If there is no link (link status stays red) or the test fails the PC network card has malfunctioned and needs to be replaced.

- If the link establishment test passes, the card is physically operating properly and the problem is likely a configuration problem with the computer's network settings.

Can SIGNALTEK be damaged by plugging it into a phone outlet or other type of voltage source?

No. SIGNALTEK has a fully isolated input. Connecting to telephone or other high voltages sources will automatically keep the input circuit open, preventing damage to the tester.

Can tests be copied from internal to external memory?

Yes. See page 3-3 for details.

Will I get email notifications about firmware upgrades?

Yes. If you register SIGNALTEK by mailing in the registration card or through IDEAL's website you will be notified as soon as firmware upgrades are available.

Can I measure dB loss or signal level of coax or CATV lines?

No. SIGNATEK does not measure the attenuation of cabling or the dB level of active CATV lines. IDEAL's LANTEK cable certifiers can measure the attenuation of coax cables to 1GHz (LANTEK 7G).

Why is the length limited to 140m?

There are two methods by which SIGNALTEK can measure the length of a cable. First is the DSP function of the Gigabit Ehternet chipset. When all four pairs are terminated to a Gigabit switch the system is able to measure the delay of the signals traveling across the cable and estimate the length of the drop.

When connected to the SIGNALTEK remote handset, an open-ended cable or a 10/100 Ethernet device the TDR is able to make length measurements with a high degree of accuracy. The TDR is

also integrated into the Gigabit Ethernet chipset and is designed to locate faults in Ethernet LAN links. Since the maximum specified distance for Ethernet is 100m (328ft), the TDR was designed with enough power to exceed this distance by 40% or measure cable up to 140m (460ft).

Do I need to update the Remote Handset's firmware?

When performing a firmware update, connect the two handsets together with an RJ45 patch cord. While firmware updates to the Remote are rare, when required, the Display handset will update the remote via the RJ45 cord during the firmware update process.

Does SIGNALTEK meet residential standard requirements?

Yes. The TIA (Telecommunications Industry Association) is developing the TIA-570 standard that defines the requirements for cabling and testing in residential applications. The TIA-570 standard describes verification, qualification, and certification as methods to test cabling is residential environments. Verification and qualification are recommended for all homes and certification is optional.

Are multiple remotes available?

Since SIGNALTEK is an active Gigabit Ethernet bit error rate tester, inexpensive passive remotes are not available as they would not be able to support the level of testing required to qualify cabling to IEEE 802.3 standards.

If my batteries die during a test or the unit freezes, will I lose tests?

No. Every autotest is saved into non-volatile memory that is not affected by losses of power. If the unit freezes during operation, it can be reset by inserting a straightened paper clip into the reset hole under the kickstand on the Display Handset. Removing a battery for a few seconds will also reset the device.

8 *Care and Calibration*

Cleaning

Clean the instrument with a damp, soft cloth. If a detergent must be used, use only types that are made for use on plastics. Special care must be taken when cleaning the LCD lens. This plastic can become scratched making it difficult to view the display.

Storage

When storing for more than 15 days the batteries should be removed to prevent excessive discharge. Batteries that are completely discharged may leak corrosive fluids that can damage the instrument's electrical components. This type of damage is not covered under the product warranty.

The instrument is shipped with plastic insulators over the battery contacts to prevent battery drain during shipping. These can be saved and reused to prevent battery discharge during storage.

Batteries

The instrument can be run from alkaline, NiMH, or NiCd batteries. Alkaline batteries have a long shelf life but are especially prone to leakage when completely discharged. Never leave alkaline batteries in the instrument for prolonged periods without using the plastic insulator to break the electrical connection.

NiMH batteries normally loose their charge during storage at a rate of about 2% per day. This means that after one month a fully charged set of NiMH batteries will only have 40% of their capacity remaining.

Calibration

SIGNALTEK does not require calibration and does not contain any user-serviceable or adjustable components. All service and repair

should be performed by an authorized IDEAL INDUSTRIES service center. Opening the SIGNALTEK housing or defacing the access seal voids the product warranty.

Registration

Owners are encouraged to register the instrument immediately upon purchase. Registered owner contact information is used to notify owners about new firmware or other product updates. Owner information is never sold or used outside of IDEAL INDUSTRIES.

9 *Specifications*

Cable Types

Voice/phone cable – USOC/RJ11/RJ12 interface

Data cable – (STP/UTP) RJ45 for CAT 3/5e/6/6a/7 cabling

Coax cable – via RJ45-to-F patch cord, series 59, 6 cabling (75 ohm)

Cable Length Measurement

TDR maximum distance: 140m/460ft

Battery Life - Standard AA Alkaline Batteries

Standby – 30 days

Cable testing – 30 hours

Monitoring – 4 hours

Ports/Connections

RJ45 shielded test interface port

Mini-USB “A” device port

Standard USB “B” host port

DC power input for long term BERT monitoring

Test Standards

Qualification/BERT – IEEE 802.3 standard for Gigabit Ethernet link performance

Wire map- EIA/TIA 568-B pairing. 568 A/B color code display options

Internal Memory

64MB Secure Digital card

32MB Linux partition (operating system)

32MB FAT partition (user storage area)

USB Device Support

USB 1.2 and 2.0 flash memory drives (thumb drives) up to 1GB capacity

USB printers that support generic PCL drivers (many HP Deskjet, Laserjet, and Officejet models)

Physical Dimensions

Display Handset: 7.9”L × 3.6”W × 1.5”D / (20.1cm × 9.1cm × 3.8cm)

Remote Handset: 6.8”L × 3.5”W × 1.5”D / (17.3cm × 8.9cm × 3.8cm)

Weight

Near-end Weight: 12.5 oz. (354g) without batteries

Remote-end Weight: 9 oz. (255g) without batteries

Specifications Subject to Change without Notice

10 *Customer Service*

Technical Assistance

For technical assistance or service questions in the U.S.A. and Canada, call IDEAL INDUSTRIES at 1-800-435-0705 or 1-800-854-2708.

Service in the USA

Before returning a unit for service, call IDEAL INDUSTRIES Technical Support at 1-800-854-2708.

When returning a unit for service:

1. Include customer name, company, address, telephone number, proof of purchase (for warranty repairs), and a description of the service required.

2. Pack in a soft carrying case, hard-sided carrying case, or wrap the instrument in heavy paper or plastic.

3. Use a strong shipping container. A double-walled carton of 250-pound test material is recommended.

4. Use a layer of shock-absorbing material 70 to 100 mm (3 to 4 inches) thick around all sides of the instrument to provide firm cushioning and to prevent the unit from moving inside the container.

5. Seal the shipping container securely.

Ship prepaid to:

IDEAL INDUSTRIES Corporation
9145 Balboa Avenue
San Diego, CA 92123
ATTN: Instrument Repair/Service

Return shipping to customers within the continental U.S.A. will be paid by IDEAL INDUSTRIES.

Service outside the USA

For technical assistance or service questions outside the U.S.A. and Canada, call your local distributor.

Before returning a unit for service outside the U.S.A., contact your local distributor or one of the IDEAL INDUSTRIES Corporation offices listed below. If your local distributor does not have a service facility, they will provide assistance in returning the tester to an authorized IDEAL INDUSTRIES service facility.

IDEAL INDUSTRIES World Wide Contact Information

IDEAL INDUSTRIES, INC.
Becker Place Sycamore,
IL 60178 USA
Customer Service Telephone 800-435-0705
Customer Service at 800-435-0705
Quality Hotline 800-304-3578
Customer Service Fax 800-533-4483
E-Mail: Ideal_Industries@idealindustries.com
International Telephone 815-895-5181
Fax 815-895-4800

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Customer Service Fax (800) 263-3115
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